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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
811 S.W. 6th Avenue
Portland, Oregon 97204

April 29, 2004

RECEIVED

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Environmental Cleanup Office

Mr. Jim McKenna
Port of Portland & Co-Chairman, Lower Willamette Group
121 NW Everett
Portland, Oregon 97209

Mr. Robert Wyatt
Northwest Natural & Co-Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Re: Portland Harbor Superfund Site; Administrative Order on Consent for Remedial Investigation and Feasibility Study; Docket No. CERCLA-10-2001-0240
Technical Memorandum 001 - Hydrodynamic/Sedimentation Modeling for Lower Willamette River

Dear Messrs. Wyatt and McKenna:

We have completed our review of the February 20, 2004 revised Technical Memorandum 001 - Hydrodynamic/Sedimentation Modeling for Lower Willamette River. Unfortunately, we are unable to approve this document at this time. There are a number of areas where EPA and its partners require additional clarification regarding the modeling approach. In addition, although EPA supports an iterative approach to the modeling effort, we believe that the modeling effort would achieve better results through the incorporation of additional site specific data.

The attached EPA and partner comments address each of the Lower Willamette Group's responses to EPA's previous comments. We request a meeting within ten days following receipt of this letter to develop a plan for finalizing this document in the most expeditious manner possible.

Please contact Chip Humphrey at (503) 326-2678 or Eric Blischke (503) 326-4006 to set up this meeting or if you have any questions. All legal inquiries should be directed to Lori Cora at (206) 553-1115.

Sincerely,

Chip Humphrey
Eric Blischke
Remedial Project Managers



cc: John Crellin, ATSDR
Helen Hillman, NOAA
Ted Buerger, US Fish and Wildlife Service
Preston Sleeper, Department of Interior
Jim Anderson, DEQ
Kurt Burkholder, Oregon DOJ
Rick Keppler, Oregon Department of Fish and Wildlife
David Stone, Oregon Public Health Branch
Rod Thompson, Confederated Tribes of Grand Ronde
Tom Downey, Confederated Tribes of Siletz
Audie Huber, Confederated Tribes of Umatilla
Brian Cunningham, Confederated Tribes of Warm Springs
Rick Eichstaedt, Nez Perce Tribe
Paul Ward and Tom Zeilman, Confederated Tribes of Yakama Nation
Valerie Lee, Environment International
Keith Pine, Integral Consultants

EPA comments on Revised Technical Memorandum 001 - Hydrodynamic/Sedimentation Modeling for Lower Willamette River

General Comments:

General Comment 1: Further elaboration on how the fourth objective (quantify the rates and locations of sediment accretion and erosion associated with various flows, including extreme events) will be achieved is required. The methodology to achieve this objective must be explicitly described in Section 5.5.

General Comment 2: Response is acceptable.

General Comment 3: A goal of the model is not to focus the risk assessment. Rather, the hydrodynamic model will be used to help determine whether exposure to subsurface sediments represents a complete exposure pathway. If it is determined, through the hydrodynamic modeling process, that subsurface sediments may be exposed in the future, they will be evaluated in the human health and ecological risk assessments and considered in the feasibility study during the evaluation of remedial action alternatives.

General Comment 4: Although the proposed iterative approach is acceptable, EPA and its partners would like to stress that failing to perform the requisite tests to quantify critical shear stresses of resuspension, resuspension rates, and settling velocities of the cohesive sediment fraction of the total sediment load, the range of uncertainties associated with the calculated resuspension and deposition rates may exceed two orders of magnitude.

General Comment 5: See Specific Comment 30.

General Comment 6: Response is acceptable.

Specific Comments:

Specific Comment 1: Response is acceptable.

Specific Comment 2: Although we agree with the proposed boundary conditions, the model must account for any lag time associated with tidal measurements at the Vancouver tidal gauge (5.5 miles upstream of Willamette River confluence with Columbia River) and the St. Helens tidal gauge (21 miles down stream of Multnomah Channel confluence with Columbia River).

Specific Comment 3: Table 7-2 must be modified to state that an objective of the model is to estimate the magnitude of accretion and erosion under a range of flow conditions.

Specific Comment 4: The stipulation that the model will be accepted if "sufficiently accurate at a reasonable confidence level" is lacks clarity. In addition, it is unclear whether a decision rule of +/- 6" is appropriate in all cases. For some areas of the site, a greater degree of accuracy will be required, while in other areas, less accuracy will be necessary. Overall, the model must be

sufficiently accurate to properly estimate risks to human health and the environment and to properly evaluate remedial action alternatives.

Specific Comment 5: Response is acceptable.

Specific Comment 6: Response is acceptable.

Specific Comment 7: Response is acceptable.

Specific Comment 8: Although the proposed iterative approach is acceptable, the evaluation of the initial model run must consider whether increased resolution in the vicinity of areas of interest is appropriate.

Specific Comment 9: Response is acceptable.

Specific Comment 10: Although there appears to be a strong relationship between peak flow and daily average flow as shown for the data in Figure 3-8, it is not possible to assess whether the relationship holds for high flow conditions because the data set does not sufficiently characterize extreme high flow events. This is a concern because 1) the relationship is more likely to break down for extreme rainfall events, and 2) the high-flow events are probably responsible for most of the river's bathymetric change. To gauge whether daily average (rather than the hourly average) values are adequate to characterize flow, the argument based on Figure 3-8 should be supplemented with a sensitivity analysis to be performed following the initial model run. If the model proves to be sensitive to the data set used to describe flow, then hourly data is more appropriate for model calibration.

Specific Comment 11: There is clearly a quasi-linear trend in velocity versus depth in the mid-channel of Transect 7, as shown in Figure 3-10, that should be addressed in modeling. A vertical average of the mid-channel profile in Figure 3-10 would overestimate river velocity near the riverbed, potentially resulting in an overestimate of sediment transport at this location. Although the proposed iterative approach is acceptable, the evaluation of the initial model run must consider the degree to which vertical averaging over or under estimates sediment accretion and erosion. EPA will use this information to determine whether the 2-D modeling approach is adequate to estimate risks to human health or the environment or to evaluate remedial action alternatives in the feasibility study.

Specific Comment 12: Response is acceptable.

Specific Comment 13: Response is acceptable.

Specific Comment 14: Response is acceptable.

Specific Comment 15: EPA does not agree with the statement regarding fine sediment and sand

sediment inflows on Page 22: “These relationships can be used to estimate fine sediment (clays and silts) and sand sediment inflows for given river flows.” There are at least three reasons why the trends shown in Figures 3-14 through 3-17 should be viewed skeptically:

1. In Figure 3-14, the “strong relationship” at high sediment concentrations is based upon only four data points, and no discernable trend exists for most of the data and at lower suspended sediment values.
2. The relationship described by regressions in the figures is not a causal one. There are many factors affecting the Willamette’s sediment load and, as a result, there is no scientific reason to expect a close correlation between these two variables.
3. As shown in Figure 5-2, the discharge-sediment load relationship does not hold for the only storm event for which data are available. The figure shows that, for the 1964 event, discharge and suspended sediment do not have a linear relationship. Although the two curves are similarly shaped, there is a time lag between the two peaks and the maximum discharge level coincides with a suspended sediment load that is relatively low for the event. A linear model would have severely underestimated suspended sediment for December 23rd and overestimated it for December 26th.

Before relying upon the discharge-sediment load regression relationship, the suspended sediment parameter should be examined with sensitivity analyses. It is likely that additional data regarding suspended sediment loads upstream of the study area, within the study area and downstream of the study area will be required to properly run the model.

Specific Comment 16: Although the proposed iterative approach is acceptable, EPA feels very strongly that site specific information regarding shear stresses of resuspension, resuspension rates, and settling velocities of the cohesive sediment fraction of the total sediment load. The modeling effort should be prepared to collect this information following the completion of the initial modeling run unless it can be demonstrated to EPA conclusively that the model can achieve the required precision without this information.

Specific Comment 17: Response is acceptable.

Specific Comment 18: Although the proposed iterative approach is acceptable, increased resolution may be required in some near shore areas to properly estimate risks to human health or the environment or to properly evaluate remedial action alternatives.

Specific Comment 19: Table 2, Appendix II of the GeoSea Sediment Trends Analysis Report for the Lower Willamette River presents the results of the grain size analysis performed to support the Sediment Trends Analysis (STA) method. This data should be used in the development of the model. In addition, although focusing on three classes of sediment (sandy mud, muddy sand and sand) is acceptable during the initial model run, further refinement of sediment classes using either the GeoSea grain size data or other data regarding the grain size of suspended sediment may be required during subsequent model runs.

Specific Comment 20: The response is acceptable. However, The CE-QUAL-W2 model of the Lower Willamette River should be consulted to develop information regarding vertical profiles of flow, temperature and other parameters to assist the hydrodynamic modeling effort. In addition, the document should clarify whether the CE-QUAL-W2 model has been calibrated, validated and peer reviewed.

Specific Comment 21: Response is acceptable.

Specific Comment 22: Response is acceptable.

Specific Comment 23: Response is acceptable.

Specific Comment 24: Response is acceptable.

Specific Comment 25: The recommendation of whether to expand the modeling effort will be based on whether the resulting resolution is sufficient to estimate risks to human health or the environment or to evaluate remedial action alternatives at the Portland Harbor site.

Specific Comment 26: It should be noted that Willamette River flows in the vicinity of the confluence of the Columbia and in the vicinity of Multnomah Channel may vary significantly in the vertical direction. As a result, the reach of the Willamette River between these points may be too short a distance for fully-developed 2-D flow to develop.

Specific Comment 27: As stated previously, increased resolution may be required in some near-shore areas as necessary to properly evaluate risks to human health or the environment or to evaluate remedial action alternatives.

Specific Comment 28: Response is acceptable.

Specific Comment 29: EPA questions some of the boundary condition input values. For example, measured flows in downtown Portland will be used to estimate upstream boundary condition flows and it is unclear whether the Columbia River sediment concentrations cited are appropriate as a downstream boundary condition. More clarification regarding the appropriateness of the boundary condition input values should be provided. In addition, site specific data for the purpose of specifying boundary conditions may be required in subsequent model runs.

Specific Comment 30: The results of the sensitivity analysis must be used to determine what modifications to the modeling effort are required. These include, but are not limited to, the collection of additional site specific data to support the modeling effort (e.g., grain size, suspended sediment concentrations, boundary conditions, critical shear stress and settling velocities); increased temporal or spatial resolution; expanding the modeling effort from 2-D to 3-D; and whether the modeling assumptions are correct.

Specific Comment 31: Response is acceptable.

Specific Comment 32: Further elaboration regarding how the model will achieve objective number 4 (Quantify the rates and locations of sediment accretion and erosion associated with various flows, including extreme events) is required. It is unclear how the model will address the issue of magnitude of sediment accretion and erosion under a variety of flow conditions. In addition, the document must clearly define what is meant by "bed sediment concentrations" that will be modeled.

Specific Comment 33: EPA understands that the modeling effort is not a contaminant fate and transport model. However, evaluation of the hydrodynamic modeling effort must consider the extent to which sediment accretion and erosion account for the observed contaminant distribution and whether the modeling results can predict future changes in contaminant distribution.

Specific Comment 34: Response is acceptable.

Specific Comment 35: See Comment 32 above.